northern Hemisphere. While most of the countries are labelled, there appears the name of but one city, that of San Diego. The globe is made to revolve slowly by a motor concealed in the base of the supporting cabinet. A careful study of this brilliantly illuminated globe shows the relation of San Diego's climate to that of other parts of the earth. The spectator sees at once that the courses of the summer isotherms between which San Diego lies, also enclose Alaska and Siberia, while the winter courses in blue embrace San Diego as well as portions of Arabia and Egypt.

It would seem practicable to apply some of these methods of attracting attention to more serious purposes than advertising. This would appear to be especially true of the illuminated and revolving globe. The boundaries of the countries of the world, the seas, islands and their designations are painted[1] on the inside of the globe. Such a method allows complete isothermal and other lines as well as the distribution of winds and rainfall to be drawn in water colors on the outside of the glass. Such drawings could be easily erased or changed.

That the general public are interested and study such a climatic display was shown by the results of the preliminary display made in one of the prominent store windows before shipment to Seattle. Several thousand people saw this exhibit during the three days it was shown at San Diego.

TORNADO AT SAVANNAH, GA.

By H. B. BOYER, Local Forecaster. Dated Savannah, Ga., May 31, 1909.

The most notable feature of the month's weather at Savannah, Ga., was a tornado that struck the city May 1, and swept over the southern and eastern portions. The path was nearly northeast and plainly marked by wrecked buildings, uprooted trees and débris along its entire course through the city. The tornado struck the city at about 11 a. m. and its time of passage across the city was less than two minutes. Its approach was so sudden that people in its path were given absolutely no warning, and before they were aware of what had happened the storm was out of sight.

The tornado followed immediately after an unusually heavy rainfall with severe lightning, and must have originated near the southern limits of the city, as no report of its existence has been received from the surrounding country and no débris was observed in the rotating cloud as it approached the city. An eye-witness describes the cloud as intensely blue-black when first observed, at an elevation of about 400 feet, and not rotating visibly. As it approached the city the cloud lowered and its counter-clockwise rotation became plainly visible. At the point of first damage the tip of the funnel was about 5 feet above the roofs of the Savannah Lumber Company, which sustained some slight damage. From here it lowered until 100 yards farther on its full force struck and wrecked a 4-storied concrete building, entirely removing the top floor. After this witnesses state that the whirling cloud rotated counter-clockwise, was filled with wreckage and intensely black. An apartment house which was destroyed seems to have been exploded. Near Kehoe's Iron Works the cloud passed over a shed opening a hole 6 feet in diameter through the roof very much as though a large cannon had been fired upward through it. After leaving the city the cloud was visible for probably 30 seconds, when all traces of it were lost and no reports of it were received from anywhere in this vicinity.

In an open place near the point of greatest severity of the storm the débris was arranged spirally about the center of the path, the greater portion being on the right side. The greater amount of damage seems also to have occurred on the right-hand side of the advancing storm. The width of the path of maximum destruction was about 200 yards and the longest stretch over which the point of the funnel was in contact with the ground was about 1,500 feet. A block of concrete, weighing about 300 pounds, was carried 3,000 feet. One death, due to injuries received, resulted from this tornado.

The tornado was preceded by severe lightning. Except for a slight oscillation recorded by the barograph and the excessive rainfall, the station instruments gave no indications of a severe storm, and the first news of it reached us by telephone.

[1]A neater and perhaps more satisfactory device for showing geographical boundaries, seas, etc., is suggested by the advertisement of one of the great steamship companies. In this case the excellent projection and map of the D. Riemer globe is glued to the outside (better *inside*) of an almost perfect globe of the proper dimensions, which is illuminated from within and revolved by motor.—*C. A., jr.*

METEOROLOGY AT COLBY COLLEGE.

By Prof. H. E. SIMPSON, University of North Dakota. Dated Waterville, Me., April 9, 1909.

Meteorology has been given as a specific course in the curriculum of Colby College for four years. Previous to this the study of the atmosphere held a relatively large place in a general course in physical geography since the introduction of this subject in 1891. The course occupies one semester and is open to sophomores and juniors, from twenty to forty of whom elect it each year.

The work consists of lectures, recitations and laboratory exercises. The lectures are generally informal and are combined with recitation and class discussion, Davis's Elementary Meteorology serving as a text. Other texts, especially those of Waldo and Russell and the reports of the United States Weather Bureau, are freely used for reference. The class exercises are frequently illustrated with the lantern, for which the collection of photographs, charts, graphs and maps prepared by the Geographic Society of Chicago[1] has been found most helpful. A few slides are used to illustrate almost every lecture and recitation. Occasionally, as in the study of clouds, a large number of photographic slides are used in a single hour.

One 2-hour period per week is devoted to practical laboratory work. This includes non-instrumental weather observations, observations by means of standard meteorological instruments and the correction of observed readings, the construction of weather charts and maps, and weather forecasting. The instrumental equipment includes the complete equipment for cooperative observers of the United States Weather Bureau, together with the barometer, the hygrometer, psychrometer, etc. No attempt is made to secure standard observations for continuous record, since a regular cooperative station of the United States Weather Bureau is located at the Hollingsworth and Whitney Paper Mills on the opposite side of the Kennebec River at Winslow, Me.

In the laboratory as well as in the classroom the lantern is a most valuable aid, especially in the study of type series of weather maps and in forecasting. A few illustrations of our method may be of interest. In the study of the progression of low-pressure areas across the United States, instead of each student working on a separate and indifferent series of original weather maps, a group of slides or even a single "quad" slide, showing a selected series, is used. From these each student may note at once the various changes from day to day and record the essential features on a blank map previously given out by the instructor, and draw his individual conclusions and express them, in writing or orally, as desired. By this method less time is taken, less explanation is required, less confusion is made, and better results are obtained than by the old method.

In forecasting, an excellent exercise consists in basing predictions on one map shown on the screen and then verifying the predictions by showing the actual weather conditions of the day following. The changes of the last twenty-four hours and the conditions shown may then be used to forecast the weather for the next day, and so on for an entire week.

The study of the veering and backing of the winds caused by the passage of a cyclone may be exhibited in a very real-

[1] See J. P. Goode: The use of the lantern in teaching meteorology. Monthly Weather Review, June, 1906, 34:263.

istic way by indicating the position of an imaginary observer by a colored bit of paper placed on the screen to the east of the diagramic cyclone and by moving the lantern in such a way that the storm center passes to the north, to the south, or directly over the observer.

A week of tri-daily non-instrumental weather observations opens the course in order to interest the student and to early cultivate the habit of observation of the weather changes that are daily and even hourly occurring. This is followed by a systematic study and construction of weather maps, step by step, through temperature, pressure, "wind and weather," as these subjects are taken up in class. Each element is worked out in a series of type maps. The elements are then correlated and their progression traced through a series of the maps of the Weather Bureau, so that when the subject of weather maps is reached in class it is simply reviewed, with emphasis on their practical and economic value. The forecasting of the weather from the maps leads to forecasting the current weather from personal observations. In this, the sons of those who "follow the sea" frequently combine experience with science and produce excellent forecasts. In connection with this later laboratory work lectures are given on "The Work of the Weather Bureau," and the course is concluded with a brief summary of the relations of weather and climate to human life.

It will be seen that the course as thus presented is for the general rather than for the special student, and as such offers an opportunity for combined scientific study and observation with most practical application to daily life.

A CHRONOLOGICAL OUTLINE OF THE HISTORY OF METEOROLOGY IN THE UNITED STATES OF NORTH AMERICA.

[*Concluded from the Monthly Weather Review, April, 1909.*]

1882. July. Three U. S. Signal Service men, Park Morrill, A. G. McAdie, and A. L. McRae, were assigned to study and observe atmospheric electricity under Professors Rowland in Baltimore, Md., and Trowbridge in Cambridge, Mass. This marked the inauguration of regular observations in this line of work at Johns Hopkins and Harvard universities. The general report on the subject was made by Prof. T. C. Mendenhall in 1887.

1882. August 10. Prof. William Ferrel was appointed assistant in the office of the Chief Signal Officer. He resigned on his seventieth birthday, September 3, 1886.

1882, 1885, 1887. A series of lectures by professors of meteorology at the Signal Service School at Fort Myer, Va., and subsequently at the Signal Office at Washington, D. C.

1883. Organization of the New England Meteorological Society, which continued in existence until April, 1896.

1883. Prof. Frank Waldo was sent to Europe to make a series of international comparisons between the standard barometers of the respective bureaus and those of the International Bureau of Standards at Paris, in order to secure international homogeneity in barometric work.

1884. Prof. H. A. Hazen took up the systematic study of thunderstorms.

1884. October. By cooperation with the U. S. Geological Survey the Signal Service undertook observations of earthquake phenomena, and a joint committee on seismology was appointed.

1884–1896. The American Meteorological Journal was started by Prof. M. W. Harrington in May, 1884, and continued under his editorship until 1891. Ginn & Company (R. DeC. Ward, editor) carried the Journal from 1891 to the end of the twelfth volume, when in 1896 publication was suspended.

1885. January 1. Prof. T. C. Mendenhall appointed assistant in the Office of the Chief Signal Officer, and assigned in charge of the Instrument Division. He resigned on October 30, 1886.

1885. Founding of Blue Hill Obs.

1885. June. Alexander G. McAdie makes quantitative studies in atmospheric electricity by means of kites at Blue Hill Observatory, Mass.

1885–1886. Profs. C. F. Marvin and H. A. Hazen compared the sling psychrometer with the dew-point apparatus at Washington, Colorado Springs, and Pikes Peak. The results were worked up by Prof. W. Ferrel and embodied in his tables for use with the whirled psychrometer.

1886. The Smithsonian Institution published "Recent Advances in Meteorology" by Wm. Ferrel.

1886. February. The first general Conference of Directors of State Weather Services was held at Washington, D. C.

1887. January 16. Gen. W. B. Hazen was succeeded by Gen. A. W. Greely (*b.* March 27, 1844) as Chief Signal Officer.

1887. All marine meteorological work under the supervision of the Signal Service was transferred to the Hydrographic Office of the U. S. Navy Department.

1887. May. The Weather Crop Bulletin, a revival of the Weekly Chronicle and the Farmers' Bulletin, began and was continued until 1906, when the title was changed to the National Weather Bulletin.

1888. The Signal Service published "Meteorological Apparatus and Methods," by Prof. C. Abbe.

1888. The system of ter-daily simultaneous weather charts changed to a system of semi-daily charts at 8 a. m. and 8 p. m., seventy-fifth meridian time.

1888. The Richard thermograph and barograph and a simple self-recording rain gage began to be introduced at the Weather Service stations.

1888. The cold-wave flag and many other signal devices were introduced, all of which were eventually reduced to a simple system of flag signals now called "Weather Flags."

1889. March. The necessary changes in the Ferguson house, prior to its occupation by the Weather Bureau, were completed on March 5 and on March 22 of this year the Washington station of the Weather Bureau was removed from its former quarters at 1709 G street NW. to the new permanent home on Twenty-fourth and M streets NW. Other divisions of the Bureau moved over at various dates.

1889. Prof. Cleveland Abbe devised, constructed, and distributed copies of his marine nephoscope as used by him on the *U. S. S. Pensacola*, 1889–1890.

1889, September, to 1890, May. The U. S. Scientific Expedition to the West Coast of Africa," otherwise called the *U. S. S. Pensacola* Eclipse Expedition, was conducted under the charge of Prof. David B. Todd of Amherst. Prof. C. Abbe was detailed as meteorologist. The expedition returned to the United States in May, 1890.

1889. September. Ferrel published his "Popular Treatise on the Winds."

1890. In this year "local forecasts" were begun at St. Paul, Minn. (Lieutenant Woodruff), and at San Francisco (Lieutenants Maxfield and Finley).

1890. October 1. The act transferring the meteorological work of the Signal Service to the Weather Bureau of the Department of Agriculture was enacted. This act went into effect July 1, 1891, and defined the scope and work of the Weather Bureau as follows:

The Chief of the Weather Bureau shall have charge of the forecasting of the weather; the issue of storm warnings; the display of weather and flood signals for the benefit of agriculture, commerce, and navigation; the gaging and reporting of rivers; the maintenance and operation of seacoast telegraph lines and the collection and transmission of marine intelligence for the benefit of commerce and navigation; the reporting of temperature and rainfall conditions for the cotton interests; the display of frost and cold-wave signals; the distribution of meteorological information in the interests of agriculture and commerce, and the taking of such meteorological observations as may be necessary to establish and record the climatic conditions of the United States, or as are essential for the proper execution of the foregoing duties.

1891. July 1. At noon the Weather Service, its buildings,